2.4 Reasoning with Properties from Algebra

Goals
- Use properties from algebra.
- Use properties of length and measure to justify segment and angle relationships.

ALGEBRAIC PROPERTIES OF EQUALITY

Let a, b, and c be real numbers.

Addition Property	If $a = b$, then $a + c = b + c$.
Subtraction Property	If $a = b$, then $a - c = b - c$.
Multiplication Property	If $a = b$, then $ac = bc$.
Division Property	If $a = b$ and $c \neq 0$, then $a \div c = b \div c$.
Reflexive Property	For any real number a, $a = a$.
Symmetric Property	If $a = b$, then $b = a$.
Transitive Property	If $a = b$ and $b = c$, then $a = c$.
Substitution Property	If $a = b$, then a can be substituted for b in any equation or expression.

Example 1 *Writing Reasons*

Solve $-2x + 1 = 56 - 3x$ and write a reason for each step.

$-2x + 1 = 56 - 3x$	**Given**
$\_\_ + 1 = 56$	_____
$x = \_\_\_$	_____

Checkpoint **Solve the equation. Write a reason for each step.**

1. $12x - 3(x + 7) = 8x$

Solve	Explain
$10y + 5 = 25$	

PROPERTIES OF EQUALITY

	Segment Length	Angle Measure
Reflexive	For any segment AB, _____.	For any angle A, _____.
Symmetric	If $AB = CD$, then _____.	If $m\angle A = m\angle B$, then _____.
Transitive	If $AB = CD$ and $CD = EF$, then _____.	If $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then _____.

Example 3 ***Using Properties of Measure***

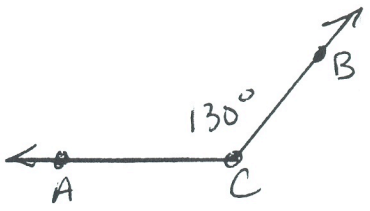
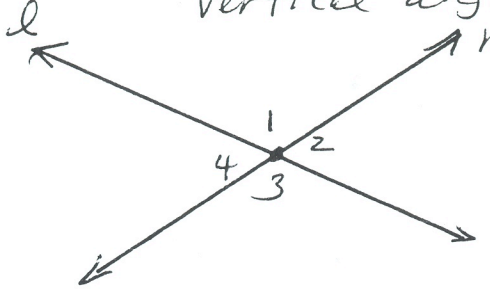
Use the information at the right to find $m\angle 1$.

$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$
$m\angle 2 + m\angle 3 = m\angle 4$
$m\angle 1 = m\angle 4$

Solution

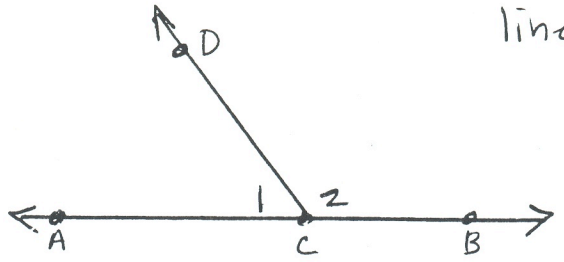
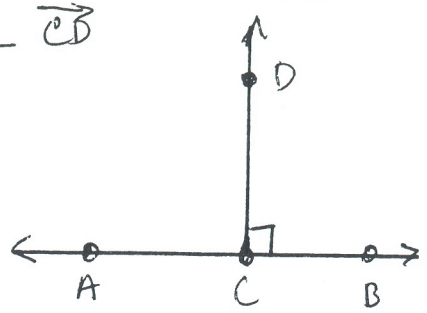
$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 =$ _____	**Given**
$m\angle 2 + m\angle 3 =$ _____	**Given**
$m\angle 1 =$ _____	**Given**
_____ + _____ + _____ $= 360°$	**Substitution property of equality**
$3($_____$) = 360°$	**Simplify.**
_____ = _____	**Division property of equality**
$m\angle 1 =$ _____	**Transitive property of equality**

Name_____ Period_____

 ∠ACB is obtuse	Lines l & m intersect and form vertical angles 
Conditional Statement	Conditional Statement
Converse	Converse
Are Conditional and Converse True? If no, provide a counter example.	Are Conditional and Converse True? If no, provide a counter example.

5.4 B
5.6

Name_____ Period_____

∠1 & ∠2 are a linear pair 	$\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$ 
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